

STRUCTURE OF THIS MICROCARD (BASIC INSTRUCTIONS)

A02 = How to use this microcard		1	2	3		4
A01 = Structure of microcard					SIS	
B01 = Trouble-shooting chart	-A-	***X*	X*XXX	XXXXX	XXXXX	*XXXX X
	-B-	*XXXX	XXXXX	XXXXX	XXXXX	XXXXX XXX
	C-	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX XXX
	D-	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX XXX
	E-	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX XX
	F-	XXXXX	XXXXX	XXXXX	XXX	
	G-	XXXXX	XXXXX	XXXX		
	H-					
	J-					
	K-					
	L-					
	M-					
N01 = Service information	-N-	*XXXX	XXXXX	XXXXX	XXX	*X XX*
		12345	67890	12345	67890	12345 678
			1		2	
					Index	
N28 = Table of contents and publication information						

- 1 = Special features
- 2 = Safety and precautionary measures
- 3 = Testers and tools
- 4 = Installation position of components

- a. Read from left to right.
- b. Title of micropicture (appears on each micropicture).

E16	Product/component/test step	
	Coordinate	

c. Limits of section

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Beginning	Mid-section	End	One-page section

A01		=> <=
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HOW TO USE THE MICROCARD

Trouble-shooting instructions for
System: EMS 2, EMS 2 A
Descriptions, photographs, terminal designations and special features refer to vehicle:
KÄSSBOHRER
Setra S 210 01.86->

These basic instructions are comprehensive trouble-shooting instructions. They must not be used as vehicle-specific instructions. Caution! Descriptions and photographs may deviate from the vehicle-specific brief instructions.
Mandatory set values, terminal assignments and special features should be taken from the vehicle-specific brief instructions only. For brief instructions, see table of contents Microcard KFZ-00..

A02		=> <=
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SPECIAL FEATURES

- * E-Gas systems EMS 2 and EMS 2A (Kässbohrer designations EFR 2 and EFR 2A) with 35-pin control-unit plug.
- * EMS 2 system without electronic traction control (ASR), with or without cruise control (FGR).
- * EMS 2A system without cruise control (FGR), with electronic traction control (ASR).
- * Fault lamp (EFR warning lamp) in the instrument panel. After the driving switch is switched on, the warning lamp lights up for approx. 3 s. and goes out afterwards if there are no faults in the system.
- * Servo-motor limitations when the system is intact:
 - when the brake is actuated or if there is no brake signal
 - when the retarder is switched on
 - when there is no speed signal
- * Safety monitoring:

The safety monitoring function prevents acceleration caused by the EMS system but undesired by the driver.

The safety monitoring system reacts to any faults in the system by limiting power output or actuating the shutoff cylinder or the control relay of the automatic transmission (depending upon the faults that have occurred in the system).
- * The engine-brake valve acts
 - on the fuel-injection pump (zero delivery) and effects closing of the exhaust flaps in vehicles with manual transmission.
 - only on the injection pump (zero delivery) in vehicles with automatic transmission.

SPECIAL FEATURES (Continued)

- * The systems are capable of learning. The idle stop is detected by the system within a given learning range and is stored in the control unit as long as the driving switch is on.

Electronic traction control: (EMS 2A only)

The E-Gas control unit is connected to the ASR control unit via an interface.

The 3 interface lines are DKV, DKR and DKE.

DKV = Throttle-valve input

DKR = Throttle-valve reduction

DKE = Throttle-valve increase

Information communication via the interface is by means of pulse-width-modulated signals.

The ASR control unit evaluates the signals from the ABS wheel-speed sensors. If there are different wheel speeds at the front and rear axles, the ASR becomes active and transmits a DKR signal to the EMS 2 A.

This reduces the angle of the injection-pump control lever within specified ranges by means of the servo motor.

This makes it possible to prevent spinning of the driven wheels by reducing power.

The DKE function (increasing the angle of the injection-pump control lever) is not yet used with the EMS 2A.

The EMS is a system designed with safety in mind. Working on this system requires detailed knowledge of the system.

SAFETY AND PRECAUTIONARY MEASURES

In order to keep persons out of danger and to prevent damage to the engine or to the control units, be sure to observe the safety and precautionary measures in the basic instructions.

Never start the engine when the battery terminals are not firmly connected.

Never disconnect the battery from the vehicle electrical system when the engine is running.

Do not use a fast charger for starting the engine.

When charging the battery with the battery in the vehicle or when providing starting aid, observe the instructions in the operating manual of the fast charger and those of the vehicle manufacturer.

Disconnect the battery from the vehicle electrical system before charging or boost charging.

Incorrect connection of the poles of the supply voltage, e.g. by incorrectly connecting the battery terminals, can lead to the destruction of a control unit.

Never disconnect or connect wiring-harness plugs from the control units and trigger boxes when the ignition is switched on.

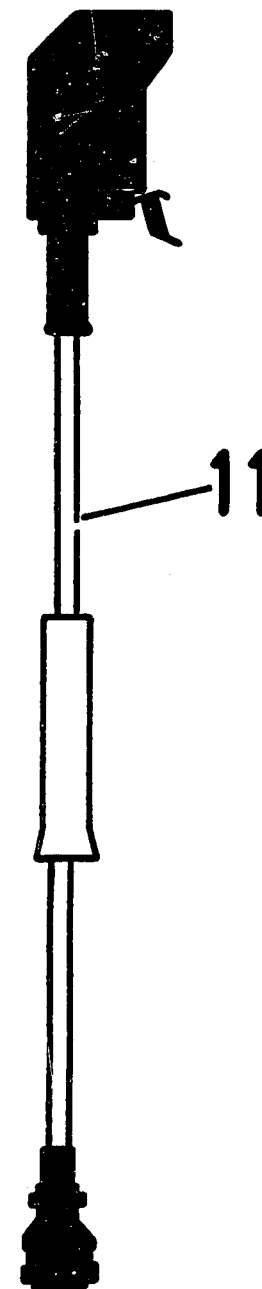
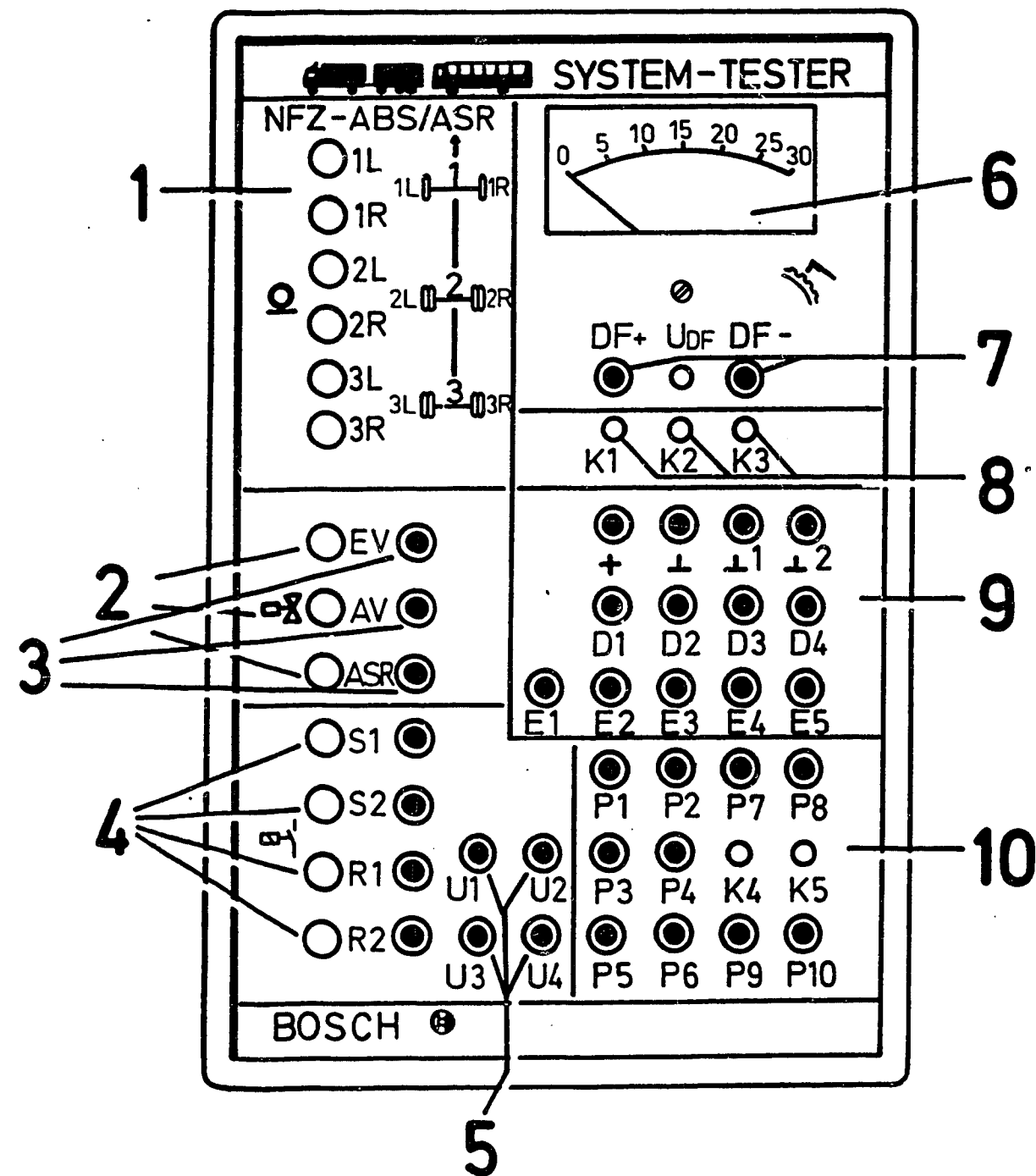
Remove control units if the ambient temperature is going to exceed 80 °C (paint-drying installation).

Remove the control units whenever performing electrical welding work on the vehicle.

EMS is a system designed with the safety of the vehicle in mind. Working on this system requires detailed knowledge of the system.

TEST EQUIPMENT AND TOOLS

Description	Designation	Part No.
Motortester	e.g. MOT 201	0 684 000 201
Electrics tester or Multimeter	e.g. ETE 014.00 e.g. MMD 301 or Fluke 75 or Fluke 23	0 684 101 400 0 684 500 301 commercially available
Comm.-veh. system tester	ETT 016.05	0 684 101 605
System connection 4		1 684 463 222
Test cable set		1 687 011 208



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SYSTEM TESTER WITH EXCHANGEABLE CABLE (sockets and buttons have diff. functions with EMS testing)

- 1 = Function selector switch
- 2 = Buttons for component actuation
- 3, 5, 9 and 10 = Test sockets for voltage and resistance measurement
- 8 = LED
- 11 = System connection 4
- 4, 6 and 7 = Not used with EMS

INSTALLATION POSITION OF COMPONENTS

The electronic control unit is installed on the auxiliary switch-board in the left-hand luggage compartment (in the S 210 - S 215 and S 216 HDS, upper illustration, arrow) or beneath a plastic cover in the intake chamber of the air filter (in the S 228 DT).

Unlatch the locking lever (1) before disconnecting the control-unit plug.

The servo motor is bolted with a bracket onto the engine firewall of V-engines (center illustration, 2) or onto the top of the engine block on in-line engines.

Note:

For testing and for removing and installing on in-line engines, the floor panel in front of the rear seat bench must be removed.

Adjustment of the connecting linkage between the servo motor and the control lever of the fuel-injection pump:

Set switch for idle increase to normal idle.

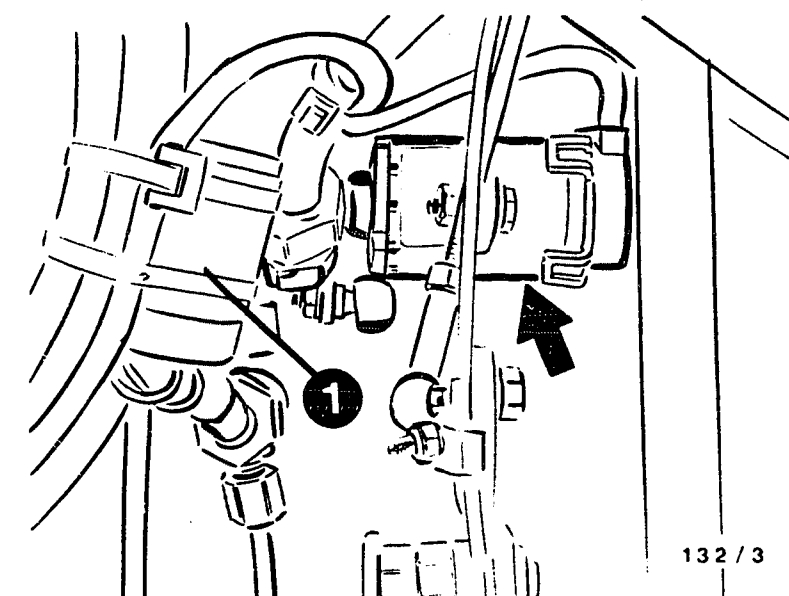
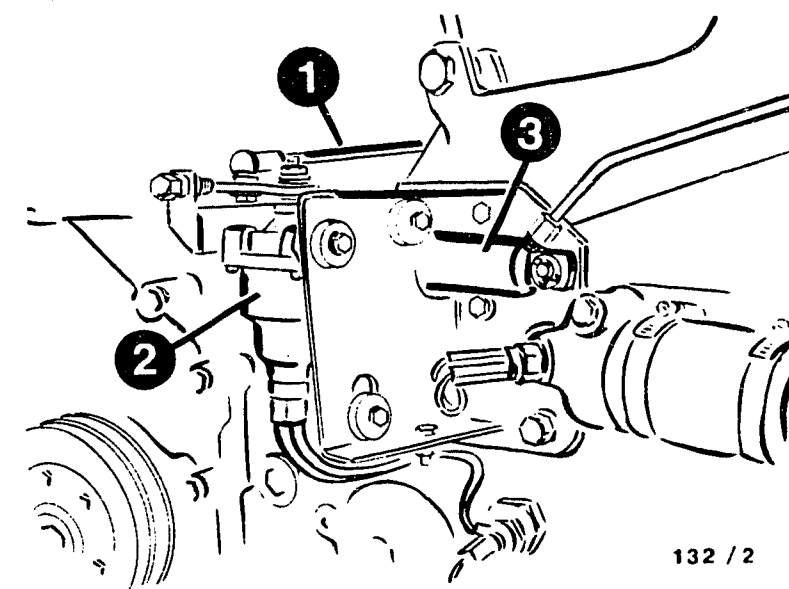
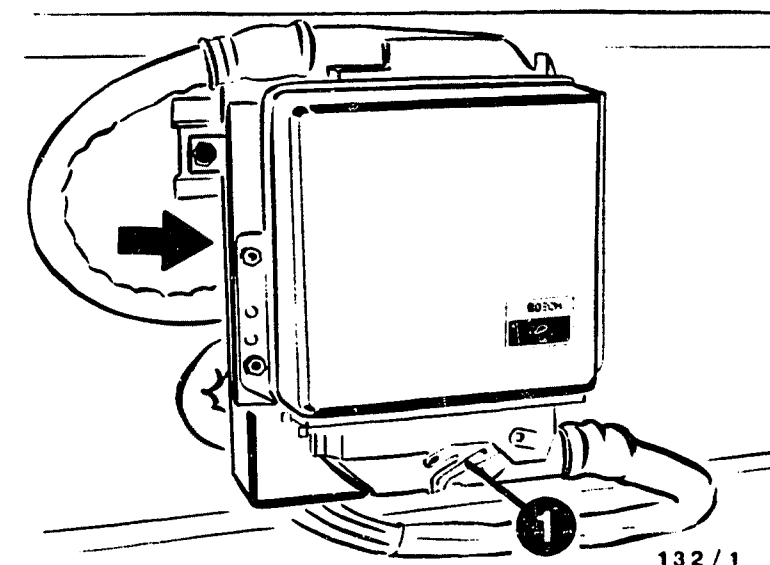
Operate engine at idle. Adjust connecting linkage (center illustration, 1) so that engine runs at approx. 600 min⁻¹.

Move stop plate for idle stop and full-load stop so that there is a clearance of approx. 1 mm between motor crank and idle stop.

Switch off the engine. Switch on driving switch. Position control lever of the fuel-injection pump manually to full-load position. Screw ball end tight in the slot. Motor crank must still be approx. 2...5 mm away from full-load stop of the stop plate. Start engine. Actuate shutoff switch. Engine must stop running.

Note: Motor crank is mounted at the factory and must not be removed.

The accelerator-pedal sensor is mounted on the front body platform in the S 210 - S 215 and S 228 DT (see lower illustration, arrow) and above the accelerator pedal in the S 216 HDS.

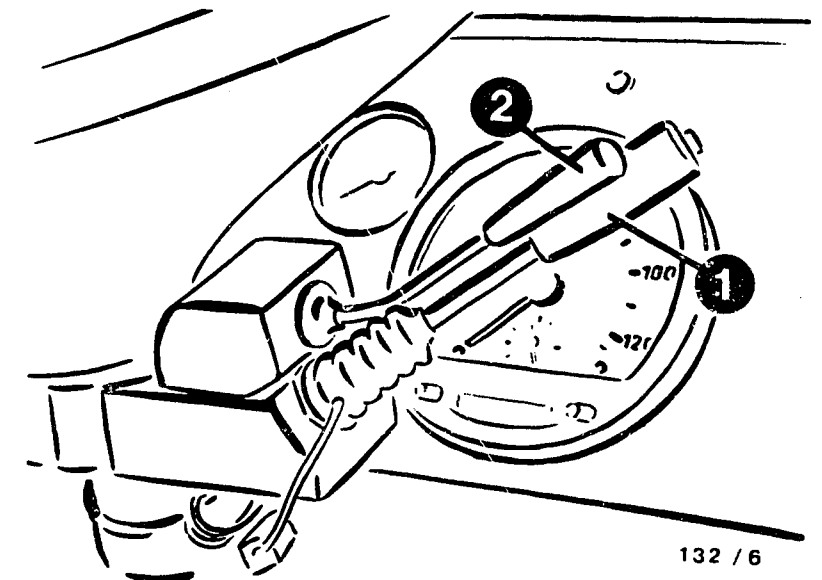
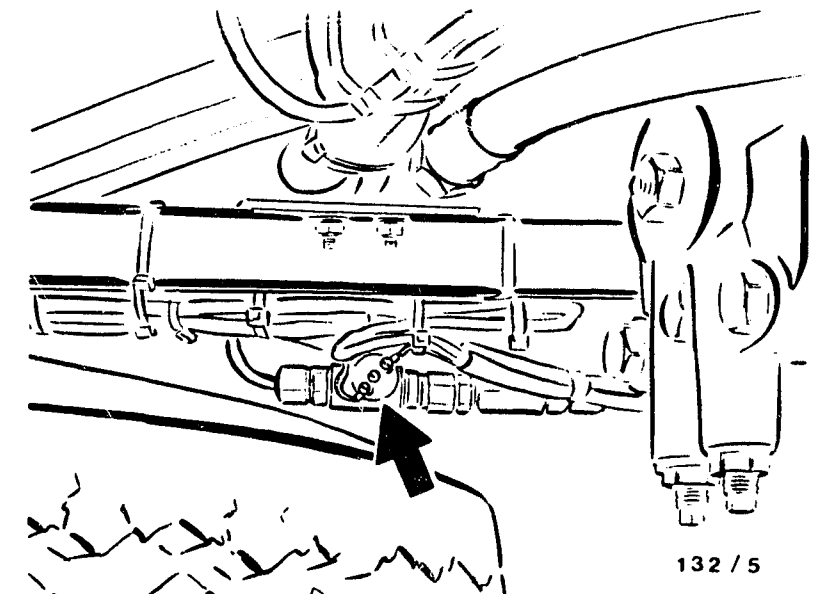
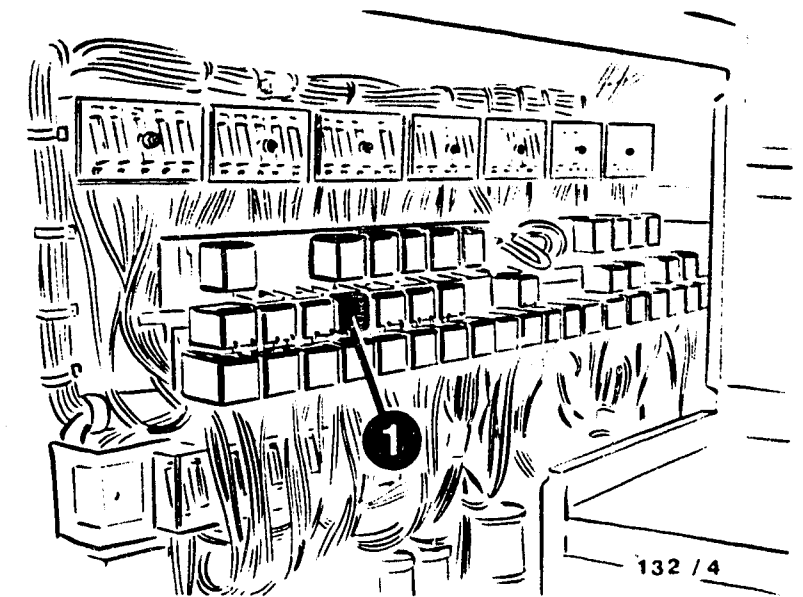


INSTALLATION POSITION OF COMPONENTS (Continued)

The central electrics (upper illustration) are installed behind the trim next to the front entrance.

The clutch switch is installed in the front cargo space (center illustration, arrow)

The control levers for the cruise control system (FGR) and retarder stage are mounted to the steering column (lower illustration, 1 and 2).
The EFR warning lamp and the idle-speed increase switch (no illustration) are installed in the instrument panel.



HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM

The TROUBLE-SHOOTING CHART starts with Coordinate B04 and contains customer complaint (fault symptom/fault characteristic feature) together with several possible causes in each case (component faults) and coordinate information for detailed trouble-shooting. If no coordinates are given, this is because the causes concerned do not require any test instructions.

In the event of a clearly established customer complaint, proceed consecutively and step by step as indicated in the trouble-shooting instructions in the stated sequence of possible causes.

Trouble-shooting must always be commenced with self-diagnosis (if fitted) or with the commercial-vehicle system tester (if available). Only then should trouble-shooting be continued in line with the trouble-shooting chart.

In the event of a customer complaint which is not clear-cut, all causes indicated in the trouble-shooting chart must be tested. In order to avoid incorrect measurements, all causes are to be checked in the specified sequence (on account of interlinkage of test steps).

HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM (CONTINUED)

The TROUBLE-SHOOTING PROGRAM contains all system and component tests indicated in the trouble-shooting chart. It is sub-divided into three rows of boxes.

The left-hand column contains test instructions and set values.
The center column contains information on trouble-shooting and fault elimination.
The right-hand column contains pictures/connection diagrams linked to the text together with explanatory notes.

If the questions posed in the left-hand column can definitely be answered with "yes", trouble-shooting is to be continued with the next box below.

If the answer to the question is "no", the center column must be applied and the tests performed in the sequence indicated there.
Following fault elimination, repeat test as a check.

TEST PREREQUISITES:

- Battery fully charged
- Engine in proper mechanical working order (e.g. compression, valve clearance etc.)
- Engine at operating temperature of approx. +80°C (if necessary)
- Proper connection of all connectors of wiring harness
- Specified tires fitted
- Vehicle ready for operation.
- Driving switch off.
- EMS fuses O.K.
- Fuel-injection system O.K.

NOTE !

Never drive with commercial-vehicle system tester connected up!
The entire test program must be repeated whenever repairs have been performed.

General notes on trouble-shooting:

Check all leads for short-circuit to ground and contact with positive leads and pay attention to worn insulation and crushing.

TROUBLE-SHOOTING CHART

Customer complaint (fault symptoms)

1. Starting motor operates, engine fails to start or starts only with difficulty.
2. Engine runs only at idle (irrespective of position of accelerator)
3. Idle problems (engine speed)
4. FGR operation not possible 1)
5. ASR operation not possible 2)
6. Engine does not change to idle when brakes, clutch or retarder are actuated
7. Maximum engine power/top speed not reached.
8. Engine cannot be switched off
9. Fault lamp

									Cause (component fault)	Coord.
*	*	*	*		*	*	*	*	Comm.-veh. system tester	B06
*								*	Servo motor blocked	B15
		*							Idle-increase switch defective	C15
*		*						*	Safety monitoring active	—
*									Test accelerator-pedal sensor	B21
		*			*				No speed signal	D09
					*				Stop light/stop-light switch defective	C23
					*				Retarder switch/relay defective	C19
					*				Clutch switch, clutch relay defective 1)	C21
*									Servo motor stiff	B15

1) Only in vehicles with EMS 2

2) Only in vehicles with EMS 2A

TROUBLE-SHOOTING CHART (Continued)

Customer complaint (fault symptoms)

1. Starting motor operates, engine fails to start or starts only with difficulty.
2. Engine runs only at idle
(irrespective of position of accelerator)
3. Idle problems
(engine speed)
4. FGR operation not possible 1)
5. ASR operation not possible 2)
6. Engine does not change to idle when brakes, clutch or retarder are actuated
7. Maximum engine power/top speed not reached.
8. Engine cannot be switched off
9. Fault lamp

Cause (Component fault)										Coord.
*	*					*		Shutoff cylinder/shutoff-cylinder control valve /shutoff switch defective	—	
					*	*		Check EFR warning lamp	D07	
					*	*		Check basic setting of servo motor	A09	
			*					Check ASR system 2)	—	
*								Check anti-jackknifing relay 2)	D19	
*								Check anti-jackknifing control 2)	—	

1) Only in vehicles with EMS 2

2) Only in vehicles with EMS 2A

HOW TO USE THE TEST CHART FOR COMMERCIAL-VEHICLE SYSTEM TESTER

- * Prior to testing, all multiple plug connections are to be checked for loose contacts.
- * Clean dirty or corroded plug contacts.
- * Pay attention to pushed-back receptacles. If necessary, bend engaging lug into position and press receptacle into plug housing as far as it will go; engaging lug locks.
- * Possibility of open circuit (positive and negative lead) in the event of kinking and crushing.
- * Disconnect and connect control-unit plug only when driving switch is switched off.
- * Connect up BOSCH COMMERCIAL-VEHICLE SYSTEM TESTER with system connection 4, instead of electronic control unit, to EMS wiring harness. The periphery is tested. A multimeter for voltage and resistance measurement is to be connected up to the commercial-vehicle system tester for data acquisition purposes. The test must always be performed in its entirety starting with test step 1.

Note: If a commercial-vehicle system tester is not available, the test can be performed by means of individual measurements at the stated control-unit plug terminals (use test cable set).

Rapid diagnosis chart for commercial-vehicle system tester with system connection 4 (1 684 463 222)

Test step	Component/function under test	Connection to system tester	Coord.
1	Winding resistance of servo motor	E1 E2	B11
2	Insulation resistance of servo motor	E1 Ground	B13
3	Freedom of movement of servo motor	E1 E2	B15
4	Servo-motor safety switch	D4 P1	B17
5	Accelerator-pedal-sensor safety switch	D4 P3	B21
6	Servo-motor potentiometer and accelerator-pedal-sensor potentiometer	P2 E5	B25
7	Accelerator-pedal-sensor potentiometer	P4 E5	B27
8	Servo-motor potentiometer	E4 E5	C03
9	ASR interface (Only vehicles with EMS 2A)	AV Ground	C07

RAPID DIAGNOSIS CHART for commercial-vehicle system tester (Continued)

Test step	Component/function under test	Connection to system tester	Coord.
10	Supply voltage (term. 30)	(+) Ground	C11
11	Driving switch (term. 15)	U1 Ground 1	C13
12	Idle-increase switch	(+) Ground 2	C15
13	Retarder signal	U2 Ground	C19
13.1	Clutch switch (Only vehicles with EMS 2)	U2 Ground	C21
14	Stop-lamp switch	U3 Ground	C23
15	Cruise-control operating element and clutch-switch operating element (Only vehicles with EMS 2)	EV Ground AV Ground	C25
16	EFR warning lamp	ASR Ground	D07
17	Speed signal	U1 D1	D09
18	Shutoff switch (also foot-operated button)	U4 Ground	D11

RAPID DIAGNOSIS CHART for commercial-vehicle system tester
(Continued)

Test step	Component/function under test	Connection to system tester	Coord.
19	Shutoff-cylinder control valve (Engine-brake valve)	—— U4 Ground	D13
19.1	Automatic-transmission control valve	——	D17
20	Anti-jackknifing-relay activation (Articulated buses only)	U1 P5	D19
21	Safety shutoff	——	D21

For production reasons:
continued on the following
coordinate.

Component/function:

Winding resistance, servo motor

N>

* Measuring instrument:

Motortester or multimeter

* Measuring range: (Ω)* Connection: Test sockets to comm.-veh. system tester

E1 (+) red

E2 (⊥) black

Control-unit terminals:

1 10

* Operation of system tester:* Triggering of function on commercial vehicle:

Unhook linkage from servo motor.
Move servo motor from idle to full-load position several times before measurement. Conduct measurement with servo motor in its rest position.

* Set value:

See brief instructions

Is measured value within set-value tolerance?

Detach control-unit plug from system adapter lead.

Use ohmmeter to check

- * control-unit plug (top picture) term.1 with respect to term.10.

Set value:

See brief instructions.

Detach plug from positioning motor.

- * Check from control-unit plug term.1 and term. 10 to wiring-harness plug, positioning motor term.A and term.B.

Set value: approx. 0 Ω

- * Check resistance directly at plug pins of positioning motor (bottom picture - 1).

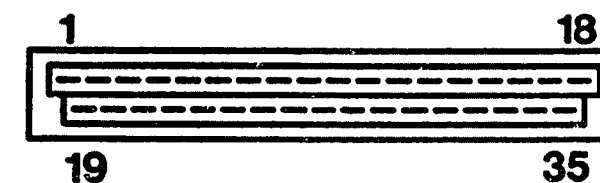
Set value:

See brief instructions.

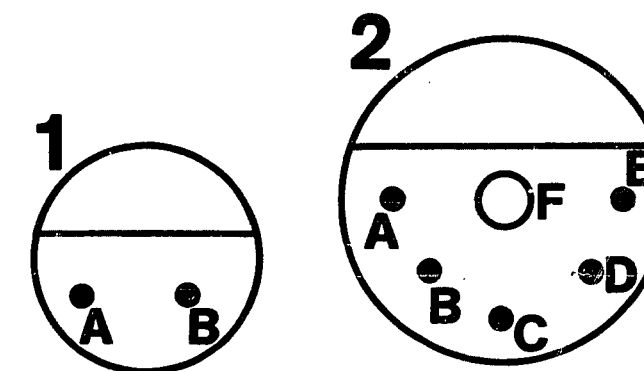
Fault elimination:

Eliminate contact resistances, open circuits, short circuits at leads.

Renew positioning motor.



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Component/function:
Insulation resist., servo motor

* Measuring instrument:
Motortester or multi-meter

* Measuring range: (Ω)

* Connection: Test sockets to comm.-vehicle system tester
E1 (+) red
Ground (↓) black

Control-unit terminals:
1 23

* Operation of system tester:

* Triggering of function on commercial vehicle:

* Set value:
greater than 1 M Ω

Is measured value within set-value tolerance?

N>

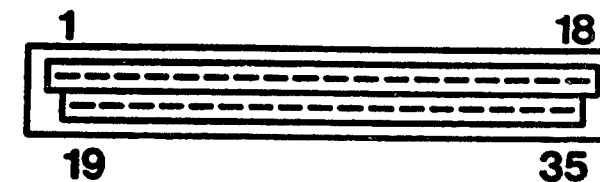
Detach control-unit plug from system adapter lead.
Detach plug from positioning motor.
Use ohmmeter to check control-unit plug term. 1 with respect to term.14 and term.10 with respect to term.23.

Set value: greater than 1 M Ω

Use ohmmeter to perform direct check at plug pins of positioning motor (bottom picture - 1) term.A and term.B with respect to ground.

Set value: greater than 1 M Ω

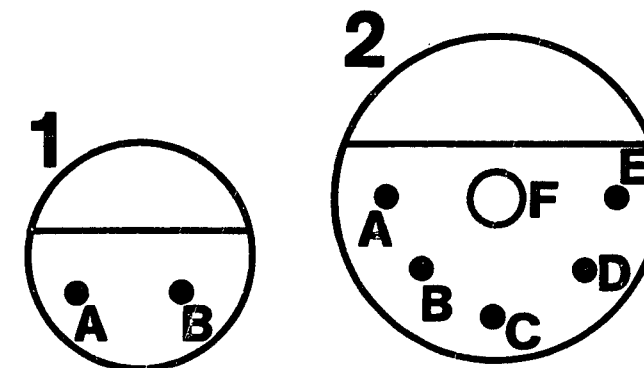
Fault elimination:
Eliminate short circuits at leads.
Renew positioning motor.



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Y

Continued on next picture page



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V

Component/function:
Freedom of movement, servo motor

N>

* Measuring instrument:

* Measuring range: (Ω)

* Connection: Test sockets to commercial-vehicle system tester

Control-unit terminals:

* Operation of system tester:
Connect to cable jumper sockets E1 and E2

* Triggering of function on commercial vehicle:
Unhook linkage from servo motor. Deflect servo motor by hand to full-load pos.

* Set value:
Servo motor must be able to be moved smoothly.

Does servo motor move smoothly?

Visual examination of the return spring.

Fault elimination:
Replace broken return spring.
Replace stiff, defective servo motor.

Y

V

Continued on next picture page

Component/function:

Servo motor, safety switch

* Measuring instrument:

Motortester or multi-meter

* Measuring range: (Ω)* Connection: Test sockets to comm.-veh. system testerD4 (+) red
P1 (⊥) blackControl-unit terminals:

22 30

* Operation of system tester:* Triggering of function on commercial vehicle:

Servo motor in idle position.

* Set value:

See brief instructions

Is measured value within
set-value tolerance?

N>

Detach control-unit plug from
system adapter lead and plug
from servo motor.Use ohmmeter to check following
leads for short circuit and
open circuit:

- * From control-unit plug (upper illustration) term.22 and term.30 to plug, servo motor (lower illustration), 2) term.E and term.D

Set value: Approx. 0 Ω

- * At control-unit plug term.22 to term.30

Set value: greater than 1 M Ω
(Plug detached from servo motor).Using ohmmeter, check directly at
the plug pins of the servo motor

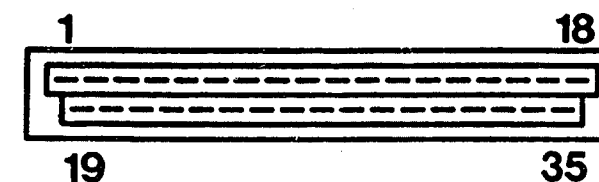
- * term.D with respect to term.E.

Set value:

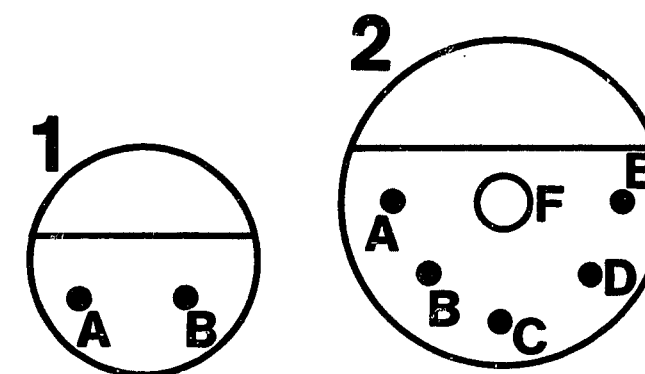
See brief instructions

Fault elimination:Eliminate contact resistances,
open circuits and short circuits
in the leads.

Replace servo motor.



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Component/function:

Servo motor, safety switch

N>

* Measuring instrument:

Motortester or multi-meter

* Measuring range: (Ω)

* Connection: Test sockets to

comm.-veh. system tester

D4 (+) red

P1 (⊥) black

Control-unit terminals:

22 30

* Operation of system tester:

* Triggering of function on

commercial vehicle:

Deflect servo motor by hand to part-load position.

* Set value:

greater than 1 M Ω

Is measured value within
set-value tolerance?

Detach control-unit plug from
system adapter lead and plug
from servo motor.

Use ohmmeter to check following
leads for short circuit and
open circuit:

* From control-unit plug (upper
illustration) term.22 and term.30
to plug, servo motor (lower
illustration), 2) term.E
and term.D

Set value: Approx. 0 Ω

* At control-unit plug term.22
to term.30

Set value: greater than 1 M Ω
(Plug detached from servo motor).

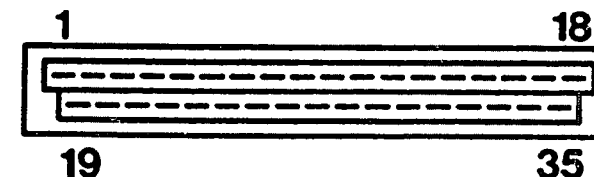
Using ohmmeter, check directly at
the plug pins of the servo motor

* term.D with respect to
term.E.

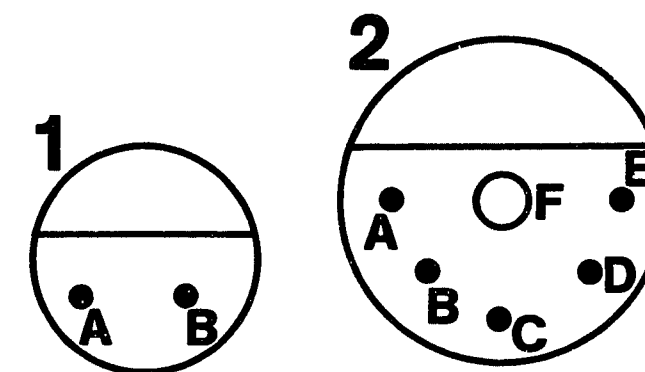
Set value:
See brief instructions

Fault elimination:
Eliminate contact resistances,
open circuits and short circuits
in the leads.

Replace servo motor.



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Component/function:

Safety switch, accelerator-pedal sensor

* Measuring instrument:

Motortester or multi-meter

* Measuring range: (Ω)* Connection: Test sockets to comm.-veh. system tester

D4 (+) red

P3 (⊥) black

Control-unit terminals:

21 30

* Operation of system tester:* Triggering of function on commercial vehicle:

Accelerator pedal in idle position.

* Set value:

See brief instructions

Is measured value within set-value tolerance?

N>

Disconnect control-unit plug from system adapter lead and plug from accelerator-pedal sensor.

Using ohmmeter, check following leads for short circuit and open circuit:

- From control-unit plug (upper illustration) term.21 and term.30 to plug, accelerator-pedal sensor (lower illustration, term.6 and term.3.

Set value: approx. 0 Ω

- At control-unit plug term.21 to term.30

Set value: greater than 1 M Ω
(Plugs disconnected from servo motor and accelerator-pedal sensor).

Using ohmmeter, check directly at the plug pins of the accelerator-pedal sensor

- term.6 to term.3.

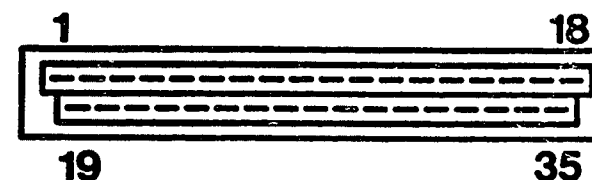
Set value:

See brief instructions

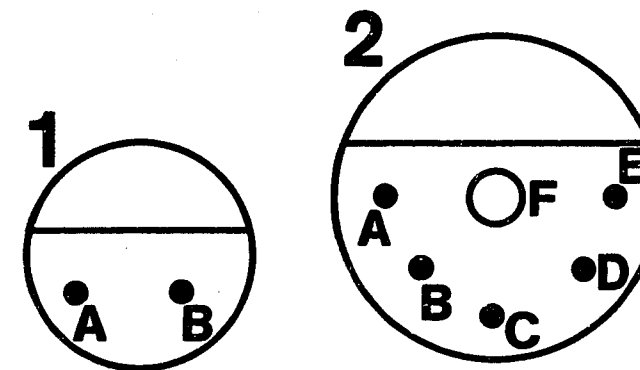
Fault elimination:

Eliminate contact resistances, open circuits and short circuits in the leads.

Replace acc.-pedal sensor.



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Component/function:

Safety switch, accelerator-pedal sensor

* Measuring instrument:

Motortester or multi-meter

* Measuring range: (Ω)

* Connection: Test sockets to comm.-veh. system tester

D4 (+) red

P3 (⊥) black

Control-unit terminals:

21 30

* Operation of system tester:

* Triggering of function on commercial vehicle:

Accelerator pedal in part-load position.

* Set value:

See brief instructions

Is measured value within set-value tolerance?

N>

Disconnect control-unit plug from system adapter lead and plug from accelerator-pedal sensor.

Using ohmmeter, check following leads for short circuit and open circuit:

- From control-unit plug (upper illustration) term.21 and term.30 to plug, accelerator-pedal sensor (lower illustration, term.6 and term.3.

Set value: approx. 0 Ω

- At control-unit plug term.21 to term.30

Set value: greater than 1 M Ω
(Plugs disconnected from servo motor and accelerator-pedal sensor).

Using ohmmeter, check directly at the plug pins of the accelerator-pedal sensor

- term.6 to term.3.

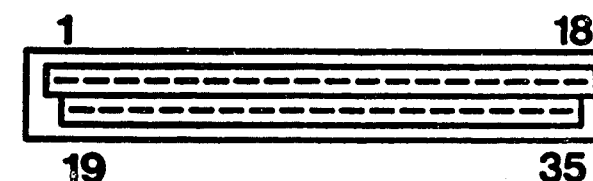
Set value:

See brief instructions

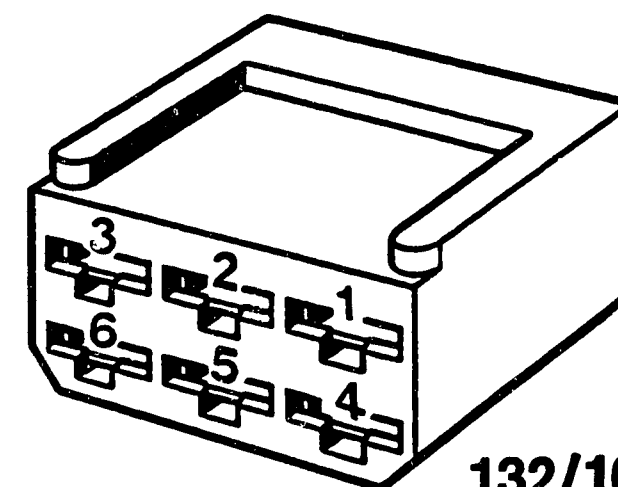
Fault elimination:

Eliminate contact resistances, open circuits and short circuits in the leads.

Replace acc.-pedal sensor.



265/430



132/16

Continued on next picture page

Component/function:

Total resistance, servo-motor
and accelerator-pedal-
sensor potentiometers

N>

* Measuring instrument:

Motortester or multi-
meter

* Measuring range: (Ω)* Connection: Test sockets
to comm.-veh. system tester

P2 (+) red

E5 (⊥) black

Control-unit terminals:

17 11

* Operation of system tester:* Triggering of function on
commercial vehicle:* Set value:

See brief instructions

Is measured value within
set-value tolerance?

Disconnect control-unit plug
from system adapter lead
and plugs from servo motor
and accelerator-pedal sensor.

Using ohmmeter, check follow-
ing leads for short circuit
and open circuit:

- From control-unit plug (upper
illustr.) term.17 and term.11
to plug, servo motor (lower
illustr., 2) term.A and
term.C and plug, accelerator-
pedal sensor (center illustr.)
term.4 and term. 5.

Set value: approx. 0 Ω

- At control-unit plug term.17
to term.11.

Set value: greater than 1 M Ω
(Plugs disconn. from servo
motor and acc.-pedal sensor)

Using ohmmeter, check directly
at the plug pins of the
servo-motor plug term.A
to term.C and of the pedal-sensor
plug term.4 to term.5.

Set value:

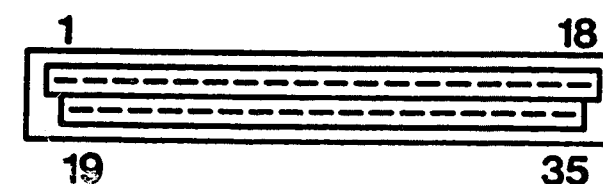
See brief instructions

Fault elimination:

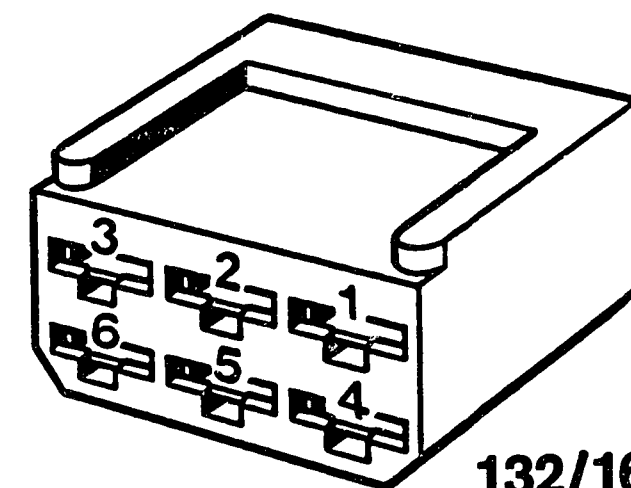
Eliminate contact resistances,
open circuits and short circuits
in the leads.

Replace acc.-pedal sensor.

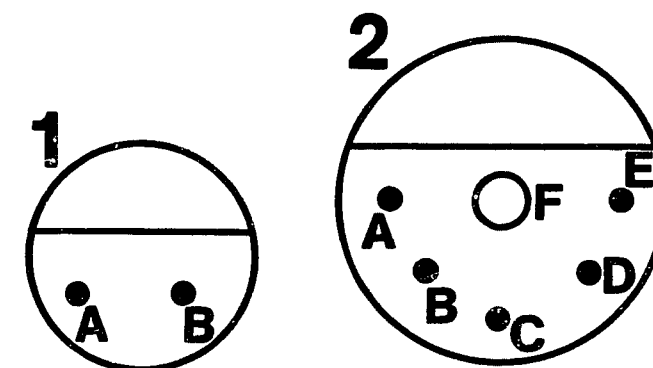
Replace servo motor.



265/430



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Continued on next picture page

Component/function:

Accelerator-pedal sensor,
potentiometer
Wiper resistance

N>

* Measuring instrument:

Motor tester or multimeter

* Measuring range: (Ω)* Connection: Test sockets to

comm.-veh. system tester

P4 (+) red

P1 (⊥) black

Control-unit terminals:

15 29

* Operation of system tester:* Triggering of function on commercial vehicle:

Accelerator pedal in idle position

* Set value:

See brief instructions

Note: In SG 219 SL/SG 221 U1 vehicles, disconnect anti-jackknifing control unit and connect term.6 to term.7 on plug.

Is measured value within set-value tolerance?

Disconnect control-unit plug from system adapter lead.

Using ohmmeter, check at control-unit plug

- term.15 to term.11 .

Set value:

see brief instructions.

Disconnect plug from accelerator-pedal sensor.

Using ohmmeter, check following leads for short circuit and open circuit:

- From control-unit plug (upper illustr.) term.15 to plug, accelerator-

pedal sensor (lower illustr.) term.2

Set value: approx. 0 Ω

- At control-unit plug term.17 and term.11 to term.15

Set value: greater than 1 M Ω

(Plug disconnected from accelerator-pedal sensor)

Using ohmmeter, check directly at the plug pins of the acc.-pedal sensor term.2 to term.5 :

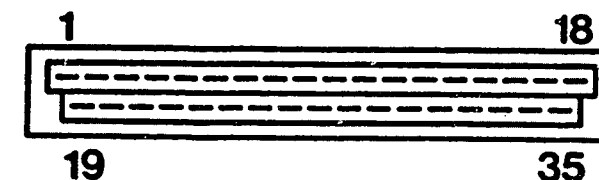
Set value:

See brief instructions

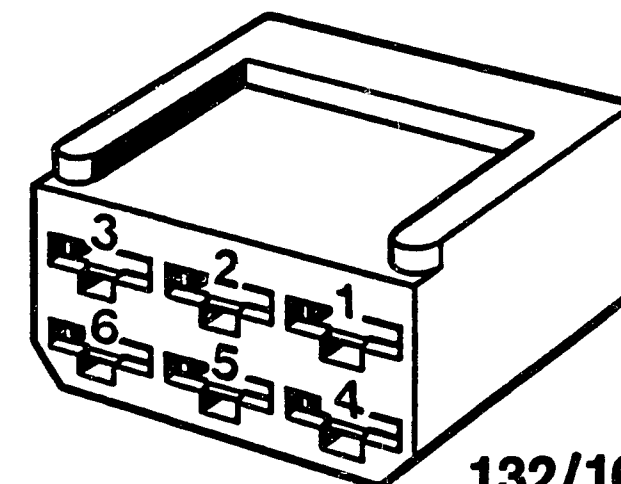
Fault elimination:

Eliminate contact resistances, open circuits and short circuits in leads.

Replace accelerator-pedal sensor.



265/430



132/16

Continued on next picture page

Component/function:

Pedal sensor, potentiometer
Wiper resistance

N>

* Measuring instrument:
Motortester or multimeter

* Measuring range: (Ω)

* Connection: Test sockets to
comm.-veh. system tester
P4 (+) red
P1 (|) black

Control-unit terminals:
15 11

* Operation of system tester:

* Triggering of function on commercial vehicle:
Depress accelerator pedal slowly to full-load position.

* Set value:
See brief instructions
Indication must change evenly between min. and max.
Note: In SG 219 SL/SG 221 UL vehicles, the anti-jackknifing control unit must be connected.

Is measured value within set-value tolerance?
Does indication change evenly?

Disconnect control-unit plug from system adapter lead.

Using ohmmeter, check at control-unit plug
- term.15 to term.11 .
Set value:
see brief instructions.

Disconnect plug from accelerator-pedal sensor.
Using ohmmeter, check following leads for short circuit and open circuit:

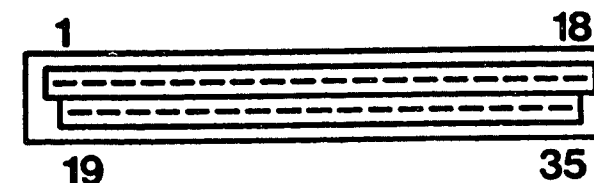
- From control-unit plug (upper illustr.) term.15 to plug, accelerator-pedal sensor (lower illustr.) term.2
Set value: approx. 0 Ω

- At control-unit plug term.17 and term.11 to term.15
Set value: greater than 1 M Ω

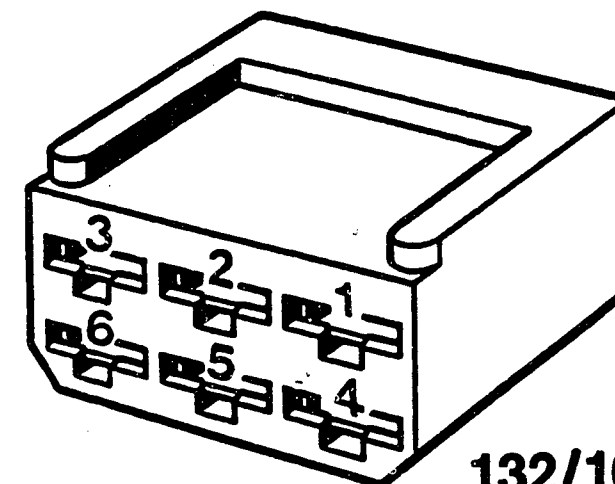
(Plug disconnected from accelerator-pedal sensor)
Using ohmmeter, check directly at the plug pins of the acc.-pedal sensor term.2 to term.5 :

Set value:
See brief instructions

Fault elimination:
Eliminate contact resistances, open circuits and short circuits in leads.
Replace accelerator-pedal sensor.



265/430



132/16

Continued on next picture page

Component/function:

Servo motor, potentiometer
Wiper resistance

N>

* Measuring instrument:

Motor tester or multimeter

* Measuring range: (Ω)* Connection: Test sockets to
comm.-veh. system tester

E4 (+) red

E5 (⊥) black

Control-unit terminals:

16 11

* Operation of system tester:* Triggering of function on
commercial vehicle:

Unhook linkage from servo
motor.

Servo motor in idle
position.

* Set value:

See brief instructions

Is measured value within
set-value tolerance?

Disconnect control-unit plug
from system adapter lead and
plugs from servo motor and
accelerator-pedal sensor.

Using ohmmeter, check following
leads for short circuit and open
circuit:

- From control-unit plug
(upper illustr.) term.16
to plug, servo motor
(lower illustr., 2)
term.B.

Set value: approx. 0 Ω

- At control-unit plug term.17
and term.11 to term.16
Set value: greater than 1 M Ω
(Plug disconnected from servo
motor).

Using ohmmeter, check direct-
ly at the plug pins of the servo-
motor plug term.B to term.C.

Set value: See brief instructions

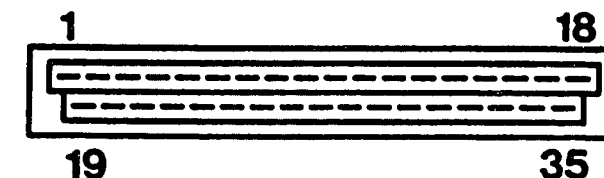
Press servo motor by hand to full-
load position.

Resistance value must change evenly.

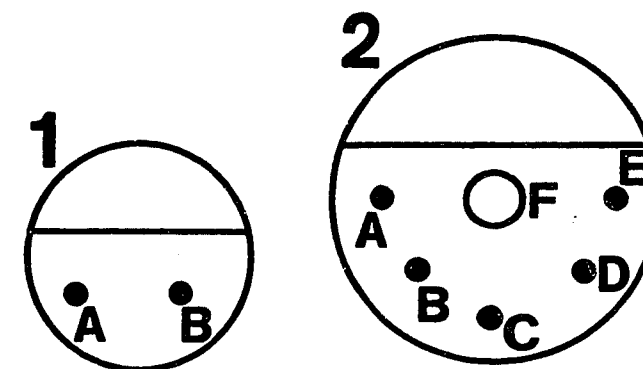
Fault elimination:

Eliminate contact resistances,
open circuits and short circuits
in the leads.

Replace servo motor.



265/430



Continued on next picture page

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TEST STEP 8 (CONTINUED 1) (TEST SPECIFICATIONS AND OPERATING INSTRUCTIONS)

Component/function:

Servo motor, potentiometer

Wiper resistance

* Measuring instrument:

Motortester or multimeter

* Measuring range: (Ω)

* Connection: Test sockets to comm.-veh. system tester

E4 (+) red

E5 (⊥) black

Control-unit terminals:

16 11

* Operation of system tester:

* Triggering of function on commercial vehicle:

Deflect servo motor slowly by hand to full-load pos.

* Set value:

See brief instructions (Indication must change evenly between min. and max.).

Is measured value within set-value tolerance?

N>

Disconnect control-unit plug from system adapter lead and plugs from servo motor and accelerator-pedal sensor.

Using ohmmeter, check following leads for short circuit and open circuit:

- From control-unit plug (upper illustr.) term.16 to plug, servo motor (lower illustr., 2) term.B.

Set value: approx. 0 Ω

- At control-unit plug term.17 and term.11 to term.16 Set value: greater than 1 M Ω (Plug disconnected from servo motor).

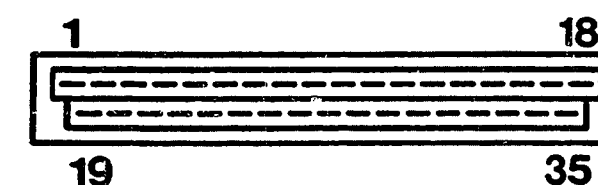
Using ohmmeter, check directly at the plug pins of the servo-motor plug term.B to term.C. Set value: See brief instructions

Press servo motor by hand to full-load position. Resistance value must change evenly.

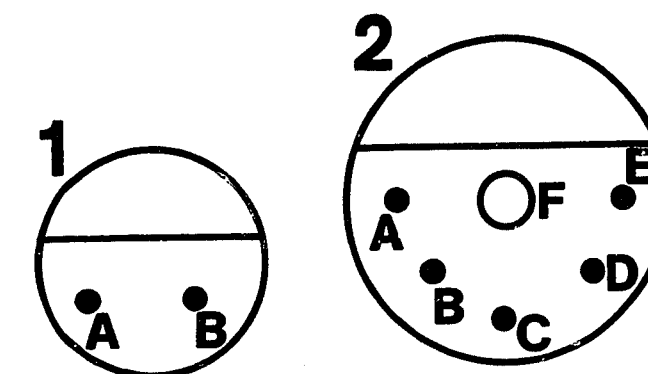
Fault elimination:

Eliminate contact resistances, open circuits and short circuits in the leads.

Replace servo motor.



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Continued on next picture page

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Component/function:

Interface, electronic traction control (DKR signal lead, only in vehicles with EMS 2A)

N>

* Measuring instrument:
Motortester or multi meter

* Measuring range: (Ω)

* Connection: Test sockets to comm.-veh. system tester

AV (+) red
Ground (⏚) black

Control-unit terminals:

27 23

* Operation of system tester:
Switch switch 1 L on

* Triggering of function on commercial vehicle:
Disconnect ASR control-unit plug. Jumper at ASR control-unit plug
(ASR 4S/4K): term. 12 and term. 27
(ASR 6S/6K): term. 11 and term. 27.

* Set value:
See brief instructions

Is measured value within set-value tolerance?

Disconnect control-unit plug from system adapter lead and plug from ASR control unit.

Using ohmmeter, check following leads for short circuit and open circuit:

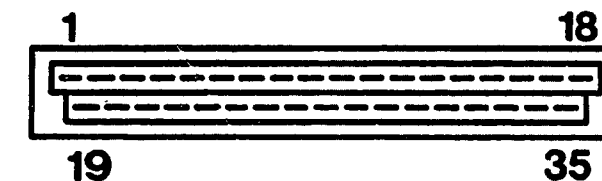
- From EMS control-unit plug (upper illustr.) term.27 to ASR control-unit plug term.12 (ASR 4S/4K) and term.11 (ASR 6S/6K)

Set value: approx. 0 Ω

- At control-unit plug term.27 to term.23 and term.27 to term.24

Set value: greater than 1 M Ω

Fault elimination:
Test ASR system.
Eliminate contact resistances and open circuits.



265/430

Continued on next picture page

Component/function:

Interface, electronic traction control (DKV signal line, only in vehicles with EMS 2A)

- * Measuring instrument:
Motortester or multimeter
- * Measuring range: (Ω)
- * Connection: Test sockets to comm.-veh. system tester
AV (+) red
Ground (↓) black
- Control-unit terminals:
26 23
- * Operation of system tester:
Switch switch 1 R on
- * Triggering of function on commercial vehicle:
Disconnect ASR control-unit plug. Jumper at ASR control-unit plug
(ASR 4S/4K): term. 14 and term. 27
(ASR 6S/6K): term. 29 and term. 27
- * Set value:
See brief instructions

Is measured value within set-value tolerance?

N>

Disconnect control-unit plug from system adapter lead and plug from ASR control unit.

Using ohmmeter, check following leads for short circuit and open circuit:

- From EMS control-unit plug (upper illustr.) term.26 to ASR control-unit plug term.14 (ASR 4S/4K) and term.29 (ASR 6S/6K)

Set value: approx. 0 Ω

- At control-unit plug term.26 to term.23 and term.26 to term.24

Set value: greater than 1 M Ω

Fault elimination:
Test ASR system.
Eliminate contact resistances and open circuits.



265/430

Continued on next picture page

V

Component/functionPower supply for EMS
control unit.

N>

* Measuring instrument:
Motortester or multi-
meter

* Measuring range: (V)

* Connection: Test sockets to
comm.-veh. system tester
(+) red
Ground (⊥) black

Control-unit terminals:
32 23

* Operation of system tester:

* Triggering of function on
commercial vehicle:
Switch driving switch on

* Set value:
See brief instructions
(K1 and K2 must light)

Is measured value within
set-value tolerance?

Y

V

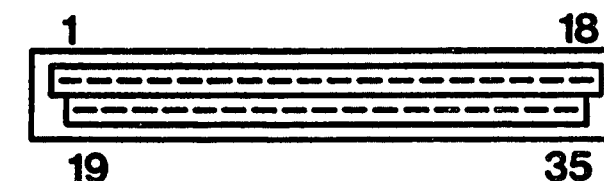
Switch driving switch off.
Disconnect control-unit plug from
system adapter lead.

Using ohmmeter, check
following leads for
continuity:
- From control-unit plug
term.32 to battery-cutoff
relay term.87
- From battery-cutoff relay
term.85 to ground.
Set value: approx. 0 Ω

Using voltmeter, check at pin
of battery-cut-off term.86 and
term.30 to ground.

Set value: greater than 20 V
(Driving switch on)

Fault elimination:
Eliminate open circuits/contact
resistances.



265/430

Continued on next picture page

V

Component/function:Power supply for EMS control
unit (driving switch)

N>

* Measuring instrument:
Motortester or multimeter

* Measuring range: (V)

* Connection: Test sockets to
comm.-veh. system tester
U1 (+) red
Ground1 (⊥) black

Control-unit terminals:
24 14

* Operation of system tester:

* Triggering of function on
commercial vehicle:
Driving switch on

* Set value:
See brief instructions
(K1 and K2 on system tester
must light).

Is measured value within
set-value tolerance?

Y

V

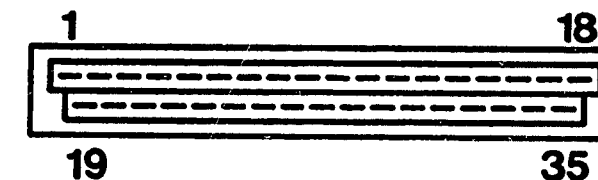
Switch off driving switch.
Check fuses.

Detach control-unit plug from
system adapter lead.

Use voltmeter to check control-
unit plug (top picture) term.
24 with respect to ground:

Set value: greater than 20V
(driving switch switched on).

Fault elimination:
Eliminate contact resistances,
open circuits, short circuits.



265/430

Continued on next picture page

Component/function:

Switch, idle increase

N>

* Measuring instrument:

Motortester or multimeter

* Measuring range: (V)* Connection: Test sockets to

comm.-veh. system tester

(+) (+) red

Ground2 (⊥) black

Control-unit terminals:

33 322

* Operation of system tester:* Triggering of function on commercial vehicle:

Driving switch on.

* Set value:

See brief instructions

Is measured value within set-value tolerance?

Switch driving switch off.

Disconnect control-unit plug from system adapter lead.

Disconnect plug from idle-increase switch.

Using ohmmeter, check lead for short circuit and open circuit:

- From control-unit plug (upper illustr.) term.33 to switch, idle increase (lower illustration).

Set value: approx. 0 Ω

- At control-unit plug term.33 to term.14

Set value: greater than 1 M Ω

Using ohmmeter, check of the idle-increase switch: directly at the plug pins

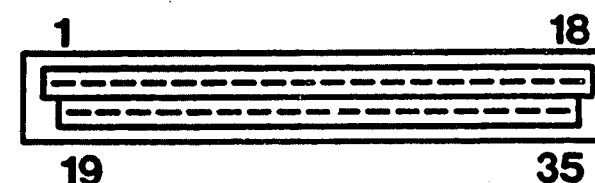
Set value:

greater than 1 M Ω (idle increase off).less than 10 Ω (idle increase on).

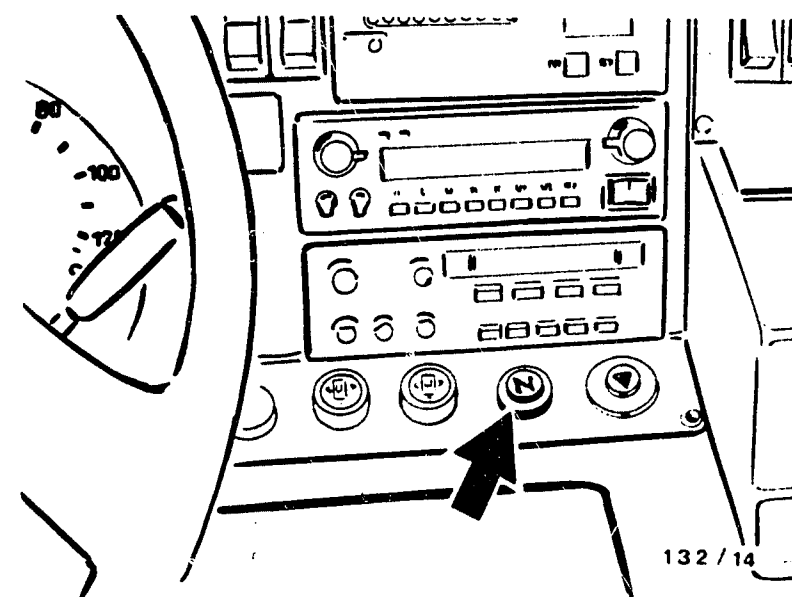
Fault elimination:

Eliminate open circuits, contact resistances and short circuits in the leads.

Replace idle-increase switch



265/430



Continued on next picture page

Component/function:

Switch, idle increase
(Continued)

* Measuring instrument:
Motortester or multimeter

* Measuring range: (V)

* Connection: Test sockets to
comm.-veh. system tester
(+) (+) red
Ground2 (⊥) black

Control-unit terminals:
33 32

* Operation of system tester

* Triggering of function on
commercial vehicle:
Driving switch on.
Actuate idle-increase
switch.

* Set value:

See brief instructions
Is measured value within
set-value tolerance?

N>

Switch driving switch off.
Disconnect control-unit plug from
system adapter lead.
Disconnect plug from idle-increase
switch.

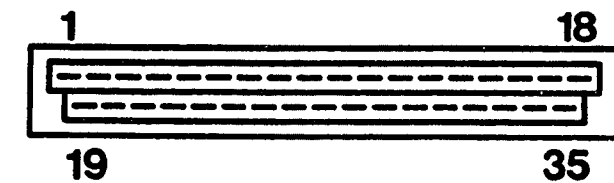
Using ohmmeter, check lead
for short circuit and open
circuit:

- From control-unit plug
(upper illustr.) term.33
to switch, idle increase
(lower illustration).
Set value: approx. 0 Ω
- At control-unit plug
term.33 to term.14
Set value: greater than 1 M Ω

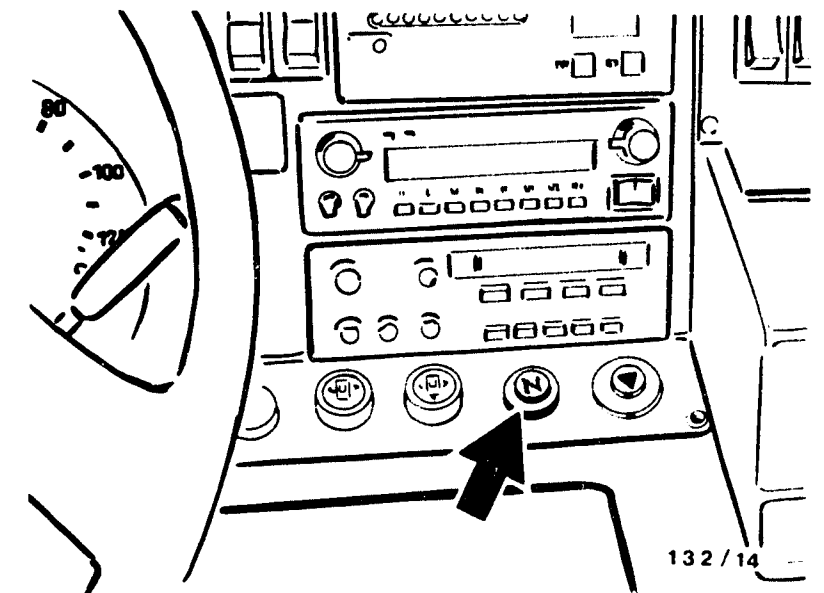
Using ohmmeter, check
of the idle-increase switch:
directly at the plug pins

Set value:
greater than 1 M Ω
(idle increase off).
less than 1 0 Ω
(idle increase on).

Fault elimination:
Eliminate open circuits,
contact resistances and short
circuits in the leads.
Replace idle-increase switch



265/430



Continued on next picture page

TEST STEP 13

(TEST SPECIFICATIONS AND NOTES ON OPERATION)

Component/function:

Retarder signal

N>

* Measuring instrument:

Motortester or multimeter

* Measuring range: (V)* Connection: Test sockets to
comm.-veh. system tester

U2 (+) red

Ground (⊥) black

Control-unit terminals:

18 23

* Operation of system tester:* Triggering of function on
commercial vehicle:

Switch retarder on.

Switch driving switch off
and on again.* Set value:

See brief instructions

In vehicles with fully
electronic retarder, signal
is present for only approx.
2 s. after driving switch
switched on.

Note: Check stop lamps.

Is measured value within set-value
tolerance?

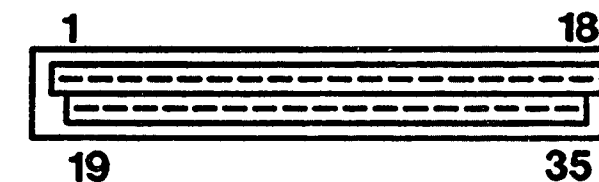
Switch driving switch off.

Disconnect control-unit plug from
system adapter lead.Using ohmmeter, check lead from
control-unit plug (upper illustra-
tion) term.18 to pin base, retarder
relay term.87b for open circuit:Set value: approx. 0 Ω

Fault elimination:

Eliminate open circuits, contact
resistances, short circuits in the
leads.

Check retarder system.



265/430

Continued on next picture page

Component/function:

Check clutch switch (only in vehicles with EMS 2 and manual transmission as of 06.87)

* Measuring instrument:
Motortester or multimeter

* Measuring range: (V)

* Connection: Test sockets to
comm.-veh. system tester
U2 (+) red
Ground (|) black

Control-unit terminals:
18 23

* Operation of system tester:

* Triggering of function on commercial vehicle:
Driving switch on.
Actuate clutch.

* Set value:
See brief instructions

Is measured value within set-value tolerance?

N>

Switch driving switch off.
Disconnect control-unit plug from system adapter lead.
Disconnect plug from clutch switch.

Using ohmmeter, check lead from control-unit plug (upper illustr.) term.18 to clutch switch for open circuit:

Set value: approx. 0 Ω

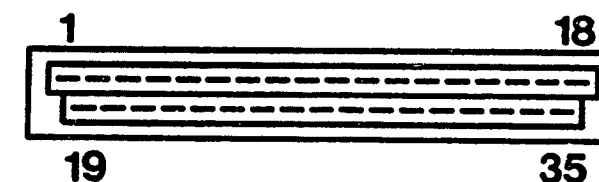
Using voltmeter, check at clutch-switch plug to ground:

Set value:
See brief instructions.

Using ohmmeter, check directly at the plug pins of the clutch switch:

Set value:
greater than 1 M Ω
(clutch not actuated).
less than 10 Ω
(clutch actuated).

Fault elimination:
Eliminate open circuits, contact resistances and short circuits in the leads.
Replace clutch switch.



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Continued on next picture page

Component/function:
Stop-lamp switch

N>

* Measuring instrument:
Motortester or multimeter

* Measuring range: (V)

* Connection: Test sockets to
comm.-veh. system tester
U3 (+) red
Ground (⊥) black

Control-unit terminals:
20 23

* Operation of system tester:

* Triggering of function on
commercial vehicle:
Driving switch on.
Actuate foot brake.

* Set value:
See brief instructions (K3 must
light when brakes actuated).
Note: Check stop lamps.

Is measured value within set-value
tolerance?
Does K3 light?

Switch driving switch off.
Disconnect control-unit plug from
system adapter lead.
Disconnect plug from stop-lamp
relay (center illustration,
arrow) and stop-lamp switch.

Using ohmmeter, check following
leads for short circuit and open
circuit:

- From control-unit plug
(upper illustr.) term.20 to
stop-lamp relay (lower
illustration) term.L
- From stop-lamp relay term.L
to plug, stop-lamp switch
Set value: approx. 0 Ω
- At control-unit plug
term.20 to term.14
Set value: greater than 1 M Ω

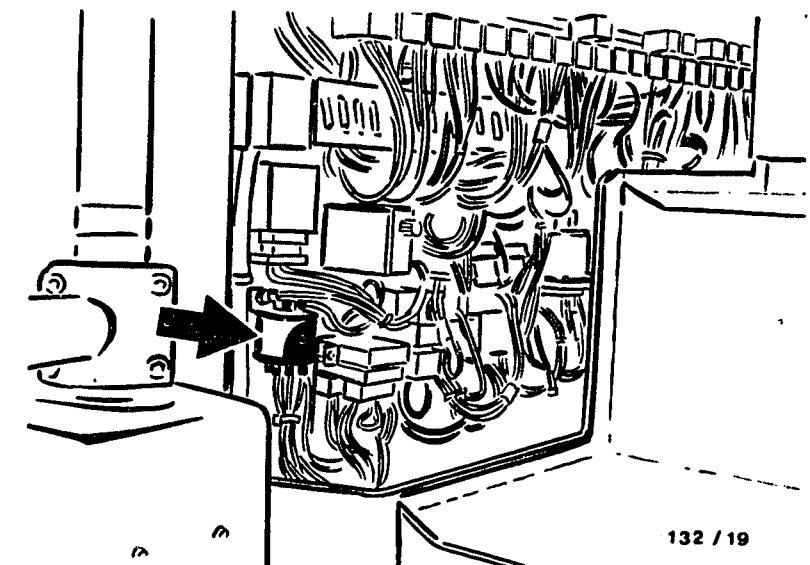
Connect plug to stop-lamp switch:
Using voltmeter, check at stop-lamp
relay term.L to ground:

Set value:
See brief instructions.

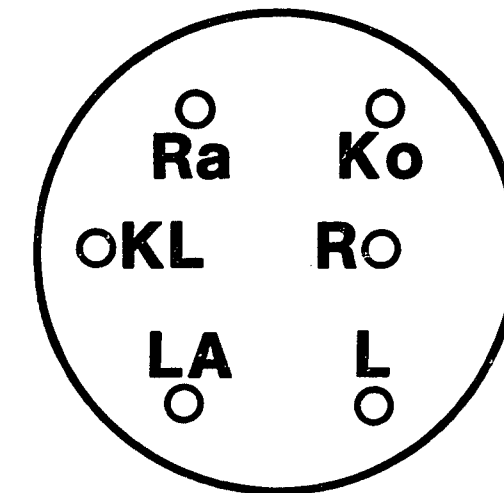
Fault elimination:
Eliminate open circuits, contact
resistances and short circuits in
the leads.
Replace stop lamps.
Replace stop-lamp relay.
Replace brake switch.



265/430



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Continued on next picture page

Component/function:
Cruise-control (FGR)
operating element
(EMS 2 only)

N>

* Measuring instrument:
Motortester or multimeter

* Measuring range: (V)

* Connection: Test sockets to
comm.-veh. system tester
EV (+) red
Ground (⊥) black

Control-unit terminals:
19 23

* Operation of system tester:
Switch switch 1 R on

* Triggering of function on
commercial vehicle:
Driving switch on.
Actuate FGR operating lever
"Set accel."

* Set value:
See brief instructions

Is measured value within set-value
tolerance?

Switch driving switch off.

Disconnect control-unit plug from
system adapter lead and plug from
cruise-control operating element.

Using ohmmeter,

- check at control-unit
plug term.19 to term.14

Set value: greater than
1 M Ω

- Check from control-unit plug
term.19 to cruise-control
operating unit wiring-harness
plug term.3

Set value: approx. 0 Ω

- Check resistance directly at the
plug pins of the cruise-control
operating element (lower illustra-
tion) tem.3 to term.5

Set value:

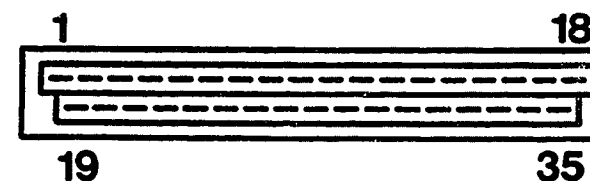
greater than 1 M Ω
(FGR operating lever not
actuated)

less than 10 Ω
(FGR operating lever "Set accel."
actuated).

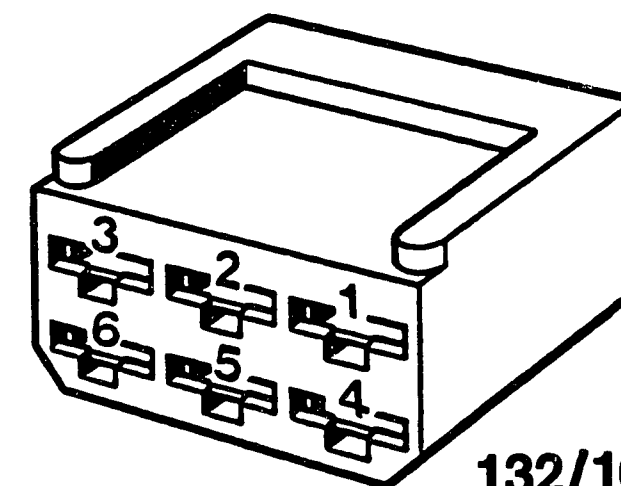
Fault elimination:

Eliminate contact resistances,
open circuits and short circuit
in the leads.

Replace cruise-control operating
element.



265/430



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Continued on next picture page

Component/function:

Cruise-control
(FGR) operating element
(EMS 2 only)

* Measuring instrument:
Motortester or multimeter

* Measuring range: (V)

* Connection: Test sockets to
comm.-veh. system tester
AV (+) red
Ground (⏚) black

Control-unit terminals:
27 23

* Operation of system tester:
Switch switch 1 L on

* Triggering of function on
commercial vehicle:
Driving switch on.
Actuate FGR operating lever
"Set decel."

* Set value:
See brief instructions

Is measured value within set-value
tolerance?

N>

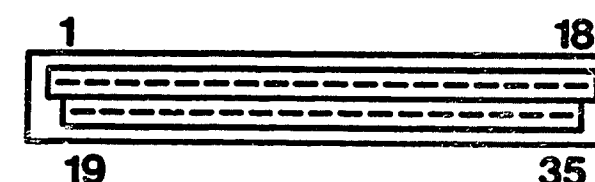
Switch driving switch off.
Disconnect control-unit plug from
system adapter lead and plug from
cruise-control operating element.

Using ohmmeter,
- check at control-unit plug
term.27 to term.14
Set value: greater than 1 M Ω

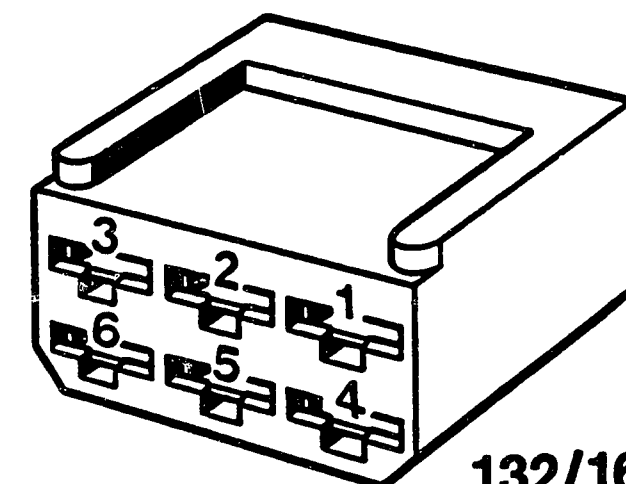
- check from control-unit plug
term.27 to cruise-control-
operating-element wiring-harness
plug term.2.
Set value: approx. 0 Ω

- Check resistance directly at the
plug pins of the cruise-control
operating element (lower illustra-
tion) term.2 to term.5
Set value:
greater than 1 M Ω
(FGR operating lever not
actuated)
less than 10 Ω
(FGR operating lever "Set decel."
actuated)

Fault elimination:
Eliminate contact resistances, open
circuits and short circuits in the
leads.
Replace cruise-control operating
element.



265/430



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Continued on next picture page

Component/function:

Cruise-control
(FGR) operating element
(EMS 2 only)

* Measuring instrument:
Motortester or multimeter

* Measuring range: (V)

* Connection: Test sockets to
comm.-veh. system tester
AV (+) red
Ground (⊥) black

Control-unit terminals:
28 23

* Operation of system tester:
Switch switch 2 L on

* Triggering of function on
commercial vehicle:
Driving switch on.
Actuate FGR operating lever
"Memory".

* Set value:
See brief instructions

Is measured value within set-value

N>

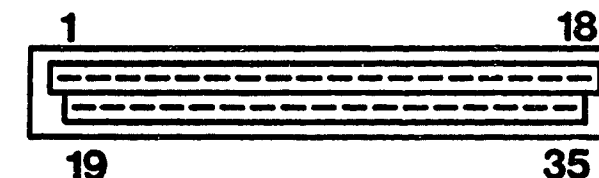
Switch driving switch off.
Disconnect control-unit plug from
system adapter lead and plug from
cruise-control operating element.
Using ohmmeter,

- check at control-unit plug
term.28 to term.14
Set value: greater than 1 M Ω

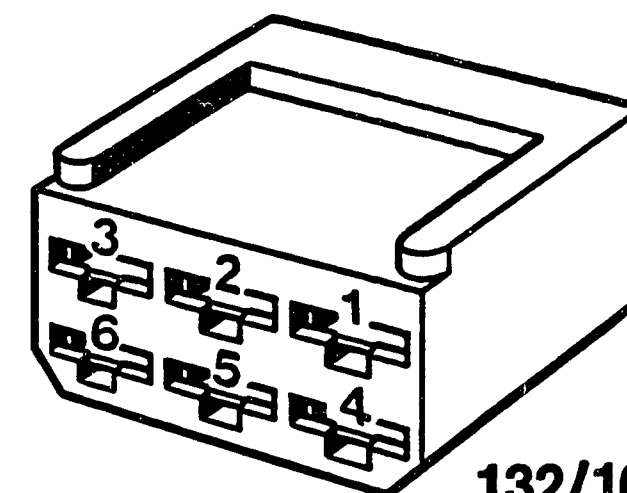
- check from control-unit plug
term.28 to cruise-control-
operating-element wiring-harness
plug term.1.
Set value: approx. 0 Ω

- Check resistance directly at the
plug pins of the cruise-control
operating element (lower
illustration) term.1 to term.5.
Set value:
greater than 1 M Ω
(FGR operating lever not
actuated)
less than 10 Ω
(FGR operating lever "Memory"
actuated)

Fault elimination:
Eliminate contact resistances,
open circuits and short circuits
in the leads.
Replace cruise-control operating
element.



265/430



132/16

Continued on next picture page

Component/function:

Cruise-control
(FGR) operating element
(EMS 2 only)

* Measuring instrument:
Motortester or multimeter

* Measuring range: (V)

* Connection: Test sockets to
comm.-veh. system tester
AV (+) red
Ground (|) black

Control-unit terminals:
26 23

* Operation of system tester:
Switch switch 1 R on

* Triggering of function on
commercial vehicle:
Driving switch on.
Actuate FGR operating lever
"Off"

* Set value:
See brief instructions

Is measured value within set-value
tolerance?

N>

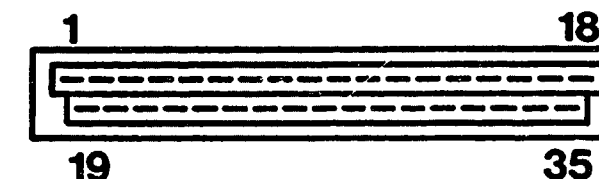
Switch driving switch off.
Disconnect control-unit plug from
system adapter lead and plug from
cruise-control operating element.
Using ohmmeter,

- check at control-unit plug
term.26 to term.14
Set value: greater than 1 M Ω

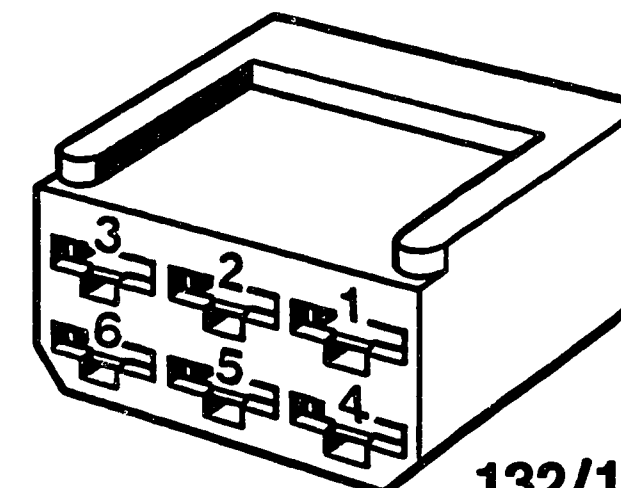
- check from control-unit plug
term.26 to cruise-control-
operating-element wiring-harness
plug term.4.
Set value: approx. 0 Ω

- Check resistance directly at the
plug pins of the cruise-control
operating element (lower
illustration) term.4 to term.5.
Set value:
greater than 1 M Ω
(FGR operating lever not
actuated)
less than 10 Ω
(FGR operating lever "Off"
actuated)

Fault elimination:
Eliminate contact resistances,
open circuits and short
circuits in the leads.
Replace cruise-control operating
element.



265/430



132/16

Continued on next picture page

Component/function:

Check clutch switch (only in vehicles with EMS 2 and manual transmission up to 06.87)

N>

* Measuring instrument:
Motortester or multimeter

* Measuring range: (V)

* Connection: Test sockets to
comm.-veh. system tester
AV (+) red
Ground (|) black

Control-unit terminals:
26 23

* Operation of system tester:
Switch switch 1 R on

* Triggering of function on commercial vehicle:
Driving switch on.
Actuate clutch.

* Set value:
See brief instructions

Is measured value within set-value tolerance?

Switch driving switch off.
Disconnect control-unit plug from system adapter lead and plug from clutch switch.

Using voltmeter,
- check at clutch-switch plug to ground.
Set value:
See brief instructions (driving switch on)

Using ohmmeter,
- check at control-unit plug
term.26 to term.14
Set value: greater than 1 M Ω

- check from control-unit plug
term.26 via cruise-control
operating element to clutch-
switch wiring-harness plug.
Set value:
less than 10 Ω
- check resistance directly at the
plug pins of the clutch switch.
Set value:
less than 10 Ω (clutch not
actuated)
greater than 1 M Ω (clutch
actuated)

Fault elimination:
Eliminate contact resistances,
open circuits and short circuits
in the leads.
Replace cruise-control operating
element.



265/430

Continued on next picture page

Component/function:

EFR warning lamp

N>

* Measuring instrument:

Motortester or multimeter

* Measuring range: (V)

- * Connection: Test sockets to
comm.-veh.system tester
ASR (+) red
Ground(⏏) black

Control-unit terminals:

12 23

* Operation of system tester:

Switch switch 2 L on.
Press ASR button.

* Triggering of function on commercial vehicle:* Set value:

See brief instructions

Is measured value within set-value
tolerance?

Switch driving switch off.

Disconnect control-unit plug from
system adapter lead.

Using voltmeter, check at control-
unit plug (upper illustration)
term.12 to term.14:

Set value: greater than 20V
(driving switch on)

Using cable jumper at control-unit
plug, connect term.12 to ground.

Warning lamp must light up

Fault elimination:

Eliminate contact resistances,
open circuits, and short circuits
in the leads.

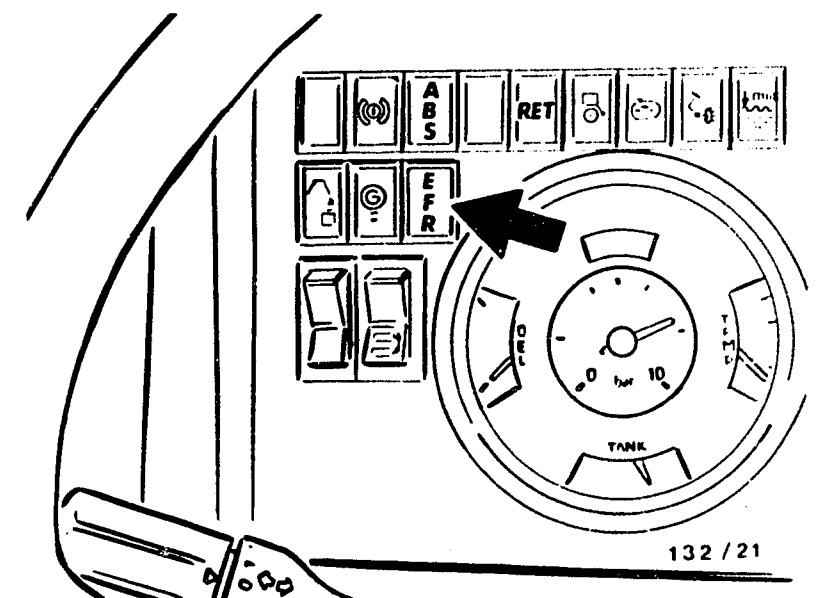
Replace warning lamp (lower
illustration, arrow).

Note:

Incorrect warning lamp leads to
fault message.



265/430



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Continued on next picture page

Component/function:

Speed signal

N>

* Measuring instrument:
Motortester or multimeter

* Measuring range: (V)

* Connection: Test sockets to
comm.-veh. system tester

U1 (+) red
D1 (⊥) black

Control-unit terminals:

3 24

* Operation of system tester:

* Triggering of function on
commercial vehicle:
Disconnect plug from limit
sensor.

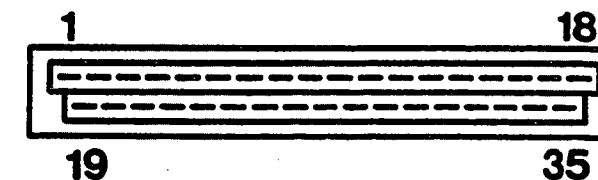
* Set value:
See brief instructions

Is measured value within set-value
tolerance?

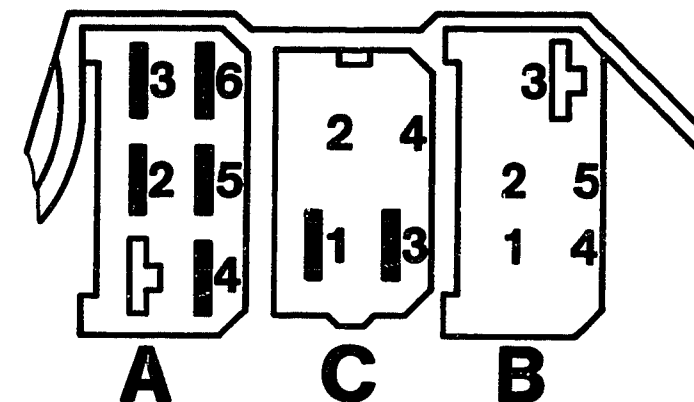
Switch driving switch off.
Disconnect control-unit plug from
system adapter lead.
Disconnect plug from trip recorder.
Using ohmmeter, check lead from
control-unit plug (upper illustra-
tion) term.3 to plug, trip recorder
(lower illustration, Terminal
diagram of trip recorder) term.C3
or term.B7:
Set value: approx. 0 Ω

Using ohmmeter, check at control-
unit plug term.3 to term.14:
Set value: greater than 1 M Ω
(plug disconnected from trip
recorder and limit (sensor))

Fault elimination:
Eliminate contact resistances, open
circuits and short circuits.
Replace limit sensor
Replace trip recorder.



265/430



Continued on next picture page

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Component/function:

Shutoff switch (vehicles with manual transmission only)

N>

* Measuring instrument:

Motor tester or multimeter

* Measuring range: (V)* Connection: Test sockets to

comm.-veh. system tester

U4 (+) red

Ground (⊥) black

Control-unit terminals:

8 23

* Operation of system tester:* Triggering of function on commercial vehicle:

Driving switch on.

Actuate shutoff switch.

* Set value:

See brief instructions.

Note: as of 08.86, term. 8 has been connected to term. 4 via a diode. In these vehicles, the shutoff cylinder is activated.

Is measured value within set-value tolerance?

Switch driving switch off.
Disconnect control-unit plug from system adapter lead and plug from shutoff switch.

Using ohmmeter, check following leads for open circuit:

- From shutoff-switch plug to control-unit plug (upper illustration) term.8

- at control-unit plug term.8 to term.4

(only vehicles as of 08.86)

Set value: approx. 0 Ω

Using voltmeter, check at shutoff-switch plug to ground:

Set value:

See brief instructions.

Using ohmmeter, check directly at the plug pins of the shutoff switch:

Set value:

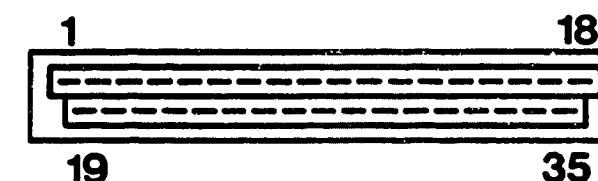
greater than 1 M Ω
(shutoff switch not actuated).

less than 10 Ω
(shutoff switch actuated).

Fault elimination:

Eliminate open circuits, contact resistances and short circuits in the leads.

Replace shutoff switch.



265/430

Continued on next picture page

Component/function:

Control valve for shutoff cylinder
(engine-brake valve)
(vehicles with manual transmission
only)

* Measuring instrument:

Motor tester or multimeter

* Measuring range: (V)* Connection: Test socketsControl-unit terminals:* Operation:

Switch switch 2 R on.
Press ASR button.

* Triggering of function on
commercial vehicle:* Set value:

Shutoff cylinder must extend

Does shut-off cylinder extend?

N>

Switch driving switch off.

Disconnect control-unit plug from
system adapter lead and plug from
shutoff-cylinder control valve.

Using ohmmeter, check following
leads for short circuit and open
circuit:

- From control-unit plug (upper
illustration) term.4 to plug of
shutoff-cylinder control valve
- From plug of shutoff-cylinder
control valve to ground.
Set value: approx. 0 Ω

- At control-unit plug term.4
to term.14:

Set value: greater than 1 M Ω
(plug disconnected from shutoff-
cylinder control valve).

Using ohmmeter, check directly at
the plug pins of the shutoff-
cylinder control valve.

Set value:

See brief instructions

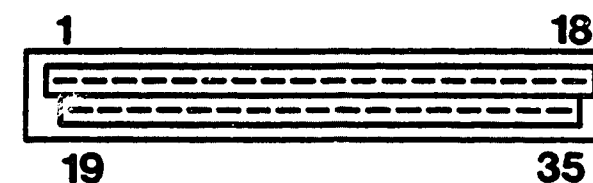
Fault elimination:

Eliminate contact resistances,
open circuits and short circuits in
the leads:

Replace shutoff-cylinder control
valve.

Check compressed-air system.

Replace shutoff cylinder.



265/430

Continued on next picture page

V

Component/function:

Blocking function of connecting diode (vehicles with manual transmission as of 08.86 only)

N>

* Measuring instrument:

Motortester or multimeter

* Measuring range: (V)

* Connection: Test sockets to

comm.-veh. system tester

U4 (+) red

Ground (⊥) black

Control-unit terminal:

8 23

* Operation:

Switch switch 2 R on.

Press ASR button.

* Triggering of function on commercial vehicle:

* Set value:

See brief instructions

Is measured value within set-value tolerance?

Y

V

Continued on next picture page

Switch driving switch off.

Disconnect control-unit plug from system adapter lead.

Using ohmmeter, check connecting connecting diode:

- at control-unit plug (upper illustr.) term.8 to term.4.

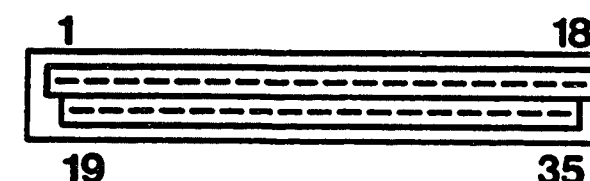
Set value: approx. 0 Ω

- at control-unit plug term.4 to term.8

Set value: greater than 1 M Ω

Fault elimination:

Replace connecting diode.



265/430

Component/function:

Control relay, automatic transmission (vehicles with automatic transmission only)

* Measuring instrument:
Motortester or multimeter

* Measuring range: (—)

* Connection: Test sockets

Control-unit terminals:

4

* Operation:

Switch switch 2 R on.
Press ASR button.

* Triggering of function on commercial vehicle:

Actuate any automatic-transmission switch (indicator light in switch lights up).

* Set value:

Indicator light must go out after ASR button is pressed (thus neutral position).

Does indicator light go out?

N>

Switch driving switch off.
Disconnect control-unit plug from system adapter lead and automatic-transmission control relay.

Using ohmmeter, check following leads for short circuit and open circuit:

- From control-unit plug (upper illustr.) term.4 to automatic-transmission control relay term.86.
 - From shutoff-switch plug to automatic-transmission control relay term.86.
- Set value: approx. 0 Ω

Using voltmeter, check at automatic-transmission control relay term.30 to ground:

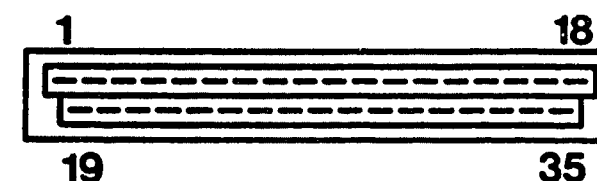
Set value:
greater than 20 V (driving switch switched on)

Fault elimination:

Eliminate contact resistances, open circuits and short circuits in the leads.

Replace automatic-transmission control relay.

Check electronic transmission control.



265/430

Continued on next picture page

Component/function:

Triggering, anti-jackknifing relay
(only vehicles SG 219 SL/SG 221 UL
with EMS 2A)

N>

* Measuring instrument:
Motortester or multimeter

* Measuring range: (V)

* Connection: Test sockets

U1 (+) red
P5 (⊥) black

Control-unit terminals:

24 31

* Operation:

* Triggering of function on
commercial vehicle:

At plugged-in control unit,
connect anti-jackknifing system
term. 11 to term. 12 using cable
jumper.

Select reverse gear or, in
vehicles with automatic trans-
mission, reversing switch.

* Set value:

See brief instructions

Is measured value within set-value
tolerance?

Switch driving switch off.
Disconnect control-unit plug from
system adapter lead and anti-jack-
knifing relay.

Using ohmmeter, check lead from
control-unit plug term.31 to anti-
jackknifing relay term.87 for open
circuit:

Set value: approx. 0 Ω

Using voltmeter, check at anti-jack-
knifing relay term.30 to ground:

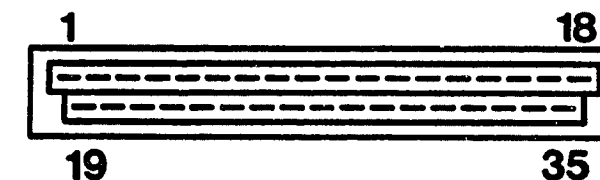
Set value:

greater than 20 V (driving
switch switched on)

Fault elimination:

Eliminate contact resistances, open
circuits and short circuits in the
leads.

Replace anti-jackknifing relay.
Check electronic anti-jackknifing
control system.



265/430

Continued on next picture page

Component/function:

Safety cutoff (vehicles with manual transmission)

N>

* Measuring instrument:* Triggering of function on commercial vehicle:

Switch driving switch off.
Disconnect control-unit plug from system adapter lead.
Connect control unit. Switch driving switch on again.
Press servo motor by hand to full-load position.

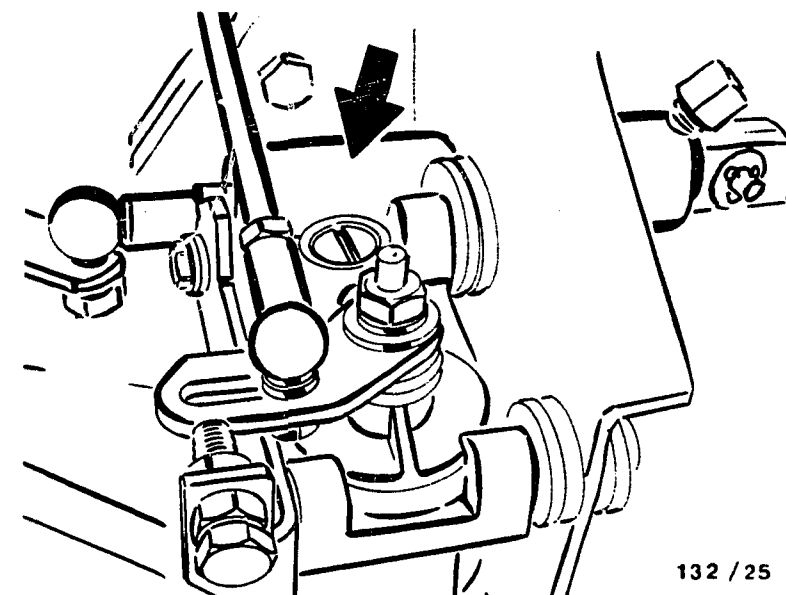
Set value:

- * Shutoff cylinder must extend.

Note: After this test, the EFR warning lamp lights. Switch driving switch off and on again after test. EFR warning lamp must go out after approx. 3 s.

Does shutoff cylinder extend?

Check compressed-air system.
Replace shutoff cylinder (upper illustration, arrow).
Replace EMS control unit.



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Continued on next picture page

Component/function:

Safety cutoff (vehicles with automatic transmission)

* Measuring instrument:* Triggering of function on commercial vehicle:

Switch driving switch off.
Disconnect control-unit plug from system adapter lead.
Connect control unit. Switch driving switch on again.
Actuate any automatic-transmission switch.
Press servo motor by hand to full-load position.

* Set value:

Automatic transmission must shift to "Neutral" (indicator light in automatic transmission switch goes out).

Note: After this test, the EFR warning lamp lights up. Switch driving switch off and on again after test.

EFR warning lamp must go out after approx. 3 s.

Does automatic transmission shift to "Neutral"?

N>

Check compressed-air system.
Check electronic transmission-control system in vehicles with automatic transmission.
Replace EMS control unit.

Return to trouble-shooting chart
B04

For production reasons:
continued on the following
coordinate.

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